

## REMARKS/ARGUMENTS

Applicants acknowledge receipt of the Office Action dated November 2, 2005, in which Claims 2-16 and 21-50 were rejected under 35 U.S.C. § 102(e) as being unpatentable over U.S. Patent No. 6,537,945 (hereinafter "Singleton"); in which Claims 49 and 50 were objected; and in which the drawing was objected. In addition, the Examiner stated that the Oath or Declaration was defective.

Applicants thanks the Examiner for the care and diligence with which she has examined the pending claims.

### I. Status of the Claims

By this reply, Claims 15, 35, 43, 44, 49 and 50 have been amended; Claims 13, 33 and 41 are now canceled; and Claims 51-53 are new.

Claims 1 and 20 stand canceled.

Claims 2-12, 14-19, 21-32, 34-40 and 42-53 are currently pending, in which:

- Claim 15 is an independent claim from which Claims 2-12, 14, 16 and 49-53 depend;
- Claim 44 is an independent claim from which Claims 21-32, 34-40, 42, 43, 45-48 depend; and
- Claims 17-19 stand withdrawn as non-elected claims in the Application.

### II. Declaration

In the Office Action dated November 2, 2005, the Examiner stated that the Declaration was defective because "it does not identify the city and either state or foreign country of residence of each inventor". The Examiner further required this defective oath or Declaration to be corrected for compliance with **37 CFR 1.67(a)** by the submission of residence information on either an application data sheet or a supplemental oath or declaration.

However, the Declaration is not defective so long as the residence information is present on at least one of the Declaration and/or Application Data Sheet (see **MPEP 605.02** where the relevant portion is reproduced below).

*"Applicant's place of residence, that is, the city and either state or foreign country, is required to be included in the oath or declaration in a*

*nonprovisional application for compliance with 37 CFR 1.63 unless it is included in an application data sheet (37 CFR 1.76). " - MPEP 605.02*

Applicants submitted an Application Data Sheet (hereinafter 'ADS') on October 16, 2003 at the time of filing the present application and properly listed the place of residence of both inventors. Applicants subsequently filed on March 3, 2004 a Declaration using the PTO/SB/01A Form ("Declaration (37 CFR 1.63) for Utility or Design Application Using An Application Data Sheet (37 CFR 1.76)"). Both of these documents are available in the Image File Wrapper of this case in the USPTO Patent Application Information Retrieval (PAIR) system. Thus, both documents have been entered in the File Wrapper and perfect the Oath or Declaration for this case.

However, in order to make sure that the Examiner is satisfied with the compliance of the Oath or Declaration with respect to 37 CFR 1.67(a), Applicants submit a Supplemental ADS in compliance with MPEP 601.05. The Supplemental ADS contains the same information as the initial ADS submitted at the date of filing, EXCEPT for the addition of the Application Number:: field with the corresponding application number; for the addition of the Filing Date:: field with the appropriate date (see underlined changes under the Application Information section at the top of the document); and for a modification under the Domestic Priority section, Continuity Type :: field to replace the type from "a non-provisional of" to "an application claiming the benefit under 35 USC 119(e)", as recommended in the "Patent Application Data Sheet: Guide for submitting Bibliographic Data for Patent Applications" (Version 5, Rev. 4/15/2003; available at [www.uspto.gov/web/offices/pac/dapp/sir/doc/adsguidelines.doc](http://www.uspto.gov/web/offices/pac/dapp/sir/doc/adsguidelines.doc)).

Even though Applicants believe that the filed Declaration supported by the initial Application Data Sheet is not defective, this Supplemental Application Data Sheet should assure that the Declaration is in compliance with 37 CFR 1.67(a).

### III. Amendment to the drawing

In response to the Examiner's objection to the drawing, Applicants submit with this Response a Replacement Sheet for the drawing of the application. As suggested by the Examiner, Applicants added the label "Figure 1". In addition, Applicants included a better quality drawing without any

substantive changes in the Replacement Sheet. No new matter was added by way of amendment to the drawing. Applicants respectfully request the withdrawal of the objection to the drawing.

**IV. Amendment to the specification**

Applicants amended paragraph [0024] the specification as filed to insert '(Figure 1)' after 'the drawing'.

Applicants further amended paragraphs [0024], [0054], [0055] and [0060] of the specification as filed to replace 'the drawing' with 'Figure 1'.

Applicants further amended paragraph [0029] of the specification as filed to correct a typographical error by replacing 'yterrbiun' with its correct spelling: 'ytterbium'.

No new matter was added by way of amendment to the specification.

**V. Objections to Claims 49 and 50**

As suggested by the Examiner, Applicants amended Claims 49 and 50 by deleting "Fischer-Tropsch" in the preamble of these claims. These amendment in the preamble do not constitute new matter and do not alter the intended scope of these claims. Applicants respectfully request the withdrawal of the objections to these claims.

**VI. Claims 2-12, 14-16, 21-32, 34-40 and 42-50 are allowable over *Singleton***

By this reply, Applicants amended independent Claims 15 and 44 to now recite: "calcining at a temperature between about 450 °C and about 900 °C". This recitation of the calcination temperature range narrows the independent claim and is supported by the specification as filed, for example by at least paragraph [040] of the specification.

Applicants further amended Claims 15 and 44 to narrow the composition of the structural promoter by adding the list of elements of originally-filed Claims 13 and 33, except for lanthanum and barium which were omitted from the Markush group. These amendments of Claims 15 and 44 are supported by the application as filed, for example by at least originally-filed Claims 13, 33, 41 and paragraph [0028] of the specification as filed.

Applicants further cancel Claims 13, 33 and 41 since these claims have a broader scope than the claims from which they ultimately depend.

Applicants further amended Claims 35 and 43 to narrow the calcination temperature. Each of Claims 35 and 43 now recites a calcination temperature between about 700 °C and about 900 °C. These amendments of Claims 35 and 43 are supported by the application as filed, for example by the catalyst Examples and paragraphs [0057]-[0058] of the specification as filed.

Applicants further amended Claim 49 to narrow the calcination temperature. Claim 49 now recites a calcination temperature between about 450 °C and about 850 °C. The amendment to Claim 49 is supported by the application as filed, for example by paragraph [0040] of the specification as filed.

Applicants respectfully traverse the Examiner's rejection, and submit that independent Claims 15 and 44 and their respective currently-pending dependent claims are not anticipated by *Singleton*. Applicants submit that *Singleton* does not teach nor suggest each and all of the limitations of Claim 15 and of Claim 44, as there is not explicit or implicit teaching of the catalyst composition of the present Application. Moreover, there is also no teaching, nor suggestion in *Singleton* that it would be desirable to solve the problem addressed by Applicants and to achieve Applicants' purpose in the present claimed invention.

***Singleton fails to teach all of the elements of Claims 15 and 44***

With respect to *Singleton*'s teaching regarding the doping of alumina, *Singleton* only discloses the doping of alumina with lanthanum oxide and/or barium oxide to provide a more thermally stable alumina support. The following elements: lanthanum and barium in the structural stabilizer are not recited in Claim 15 nor in Claim 44. Thus, *Singleton* does not anticipate Claims 15 and 44.

Moreover, with respect to cobalt and 'typical' promoters (as listed in *Singleton* Col 6, lines 11-21) which are impregnated on doped alumina in *Singleton*, *Singleton* clearly regards them as *catalytic components* of the catalyst and not as structural promoter(s) for the alumina support as set forth in the present invention (see *Singleton* Col 6, line 11). Applicants explained the difference between a catalytic promoter and a structural promoter in the application and is recited here: "*the purpose of a catalytic promoter generally involves its presence on the surface of the catalyst support alongside a catalytic metal whereas the purpose of a structural promoter generally*

*involves its presence in the lattice of the catalyst support*’ – see paragraph [0046] in Applicants’ specification as filed. *Singleton* does not disclose or hint that these catalytic elements may be used as ‘dopants’ (or in Applicants’ terms, structural promoters) to provide greater thermal stability to the alumina support. Furthermore, *Singleton* certainly does not disclose or hint that these catalytic elements may be used as structural promoters to provide greater *hydrothermal* stability to the alumina support.

With respect to titanium as one of the possible elements comprised in the structural promoter, *Singleton* regards titanium to be an impurity of alumina, and further discloses that its addition is incidental during the  $\gamma$ -alumina preparation from aluminum alkoxide (*Singleton* Catalysts 1-3 in Table 1; Col. 8 line 65 to Col. 9 line 2). *Singleton* further teaches that titania, as an impurity in alumina, has an negative impact on the activities of ruthenium-promoted cobalt-on alumina catalysts (see *Singleton* Col. 9 lines 60-65). In fact, one of the purposes for the doping of alumina stated by *Singleton* is the mitigation of the detrimental impact of incidental titanium impurity in alumina on the activity of some cobalt alumina-supported catalysts (see *Singleton* Col. 9 lines 66-67; Catalyst 4 in Table 1). As such, *Singleton* teaches away from the deliberate addition of titanium to the alumina support due to its detrimental impact on the catalyst’s activity.

With regard to the calcination step, after *Singleton* impregnates cobalt nitrate and one or more promoter compounds onto alumina which already has been doped, *Singleton* teaches calcining the alumina impregnated with cobalt and one or more promoters at a temperature held at approximately 250-400°C, with a specific example carried out at 300°C (see *Singleton*, Col. 6, lines 22-57). Thus, the temperature used during calcination after impregnation of alumina with cobalt and catalytic promoter(s) in *Singleton* is well below the calcination temperature range recited in currently-amended Claims 15 and 44. Furthermore, *Singleton* teaches that the successive exposure of the catalyst to high temperatures can cause an “encapsulation of cobalt particles and the formation of harder to reduce or totally non-reducible cobalt-metal compounds” (*Singleton* Col. 3 lines 11-15). For that reason, one having ordinary skill in the art would presume that *Singleton* would not find desirable to calcine the doped alumina impregnated with these catalytic elements at high temperatures such as recited in currently-amended Claims 15 and 44 of the present application. For doing so would result in ‘burying’ the catalytic components and decrease their effectiveness and their ability to reduce, which ultimately produce a less performing catalyst which is contrary to the

result *Singleton* sought (see Col. 3 lines 50-51).

Thus, in view of at least the reasons stated above, Applicants submit that *Singleton* fails to teach or suggest all of the elements of currently-amended Claims 15 and 44.

***Singleton does not anticipate Claims 4-6, 8, 11, 14, 12, 23-28, 30, 36-38, 45 and 50***

With respect to *Singleton*'s teaching regarding the method of making the doped alumina, *Singleton* only discloses the co-hydrolysis of aluminum alkoxide with lanthanum alkoxide or barium alkoxide.

*Singleton* does not disclose the use of precipitation or co-precipitation or sol-gel method for the purpose of making doped alumina as recited in Claims 4-6, 8, 11, 14, 12, 23-28, 30 and 36-38; nor does he disclose the use of inorganic precursors of alumina such as those listed on Claims 8 and 30. *Singleton* does not disclose steaming the support precursor before calcination as recited in Claim 14. *Singleton* does not disclose a surface area loss of less than 20 percent for the doped alumina when subjected to a water partial pressure of at least 5 bars Abs and a temperature greater than 200 °C as recited in Claims 45 and 50.

For all of these reasons, *Singleton* fails to teach all of the elements of Claims 4-6, 8, 11, 14, 12, 23-28, 30, 36-38, 45 and 50 and does not anticipate these claims.

***Singleton fails to teach the source of the problem and Applicants' intended purpose***

Not only does *Singleton* fail to teach or suggest all of the limitations of Claims 15 and 44 and *a fortiori* of their respective dependent claims, there is also no teaching nor suggestion that it would be desirable to 'dope' alumina to resolve the source of the problem addressed by Applicants in the present claimed invention and to achieve Applicants' purpose.

*Singleton*'s teaching differs from the present claimed invention with respect to the intended effect of the doped alumina as a support for the hydrocarbon synthesis catalyst support. *Singleton* discloses two purposes for the doping of alumina: greater thermal stability (*Singleton* Abstract; Figure 1]) and mitigation of the detrimental impact of incidental titanium impurity in alumina on the activity of some cobalt alumina-supported catalysts (*Singleton* Col. 9 lines 66-67). However, *Singleton* does not expressly or implicitly teach the addition of a 'dopant' for *enhancing the hydrothermal stability of the catalyst support*, which is referred by Applicants as the ability for this

support to withstand sustained conditions of elevated temperature and high water partial pressure (see paragraph [0042] of the Applicants' specification as filed). Applicants further defined that a hydrothermally-stable support refers to a catalyst support that undergoes less than a twenty percent change in surface area when subjected to water partial pressures in excess of 5 bars absolute at temperatures of greater than 220 °C for periods of time in excess of 2 hours (see paragraph [0042] of the Applicants' specification as filed). Applicants have also disclosed a steaming treatment in order to assess the hydrothermal stability of supports and catalysts under approximate Fischer-Tropsch conditions (see paragraph [0059] of the Applicants' specification as filed). Thus, hydrothermal conditions not only encompass high temperature but also *presence of steam (or vaporized water)*.

Applicants found that the cause for lack of stability of the alumina support under hydrothermal conditions differs from that under high thermal conditions. For example, when subjecting the alumina structure to high temperatures, as described by *Singleton*, the high temperature causes the "slow conversion of *the alumina from its gamma-alumina phase to other forms (delta-alumina then theta-alumina) which have much lower surface areas*", and ultimately, very high temperature causes the "*collapse of the structure resulting in the formation of a dense, highly stable, low surface area alpha-alumina*" (see *Singleton* Col. 3 lines 26-34). Thus, the cause of the problem that *Singleton* is interested in solving by adding the dopant to alumina is the densification of alumina from the gamma phase to other alumina phases. This densification effects the pore collapse in the alumina structure and results in loss of surface area. In contrast, Applicants have found that the exposure of a gamma-alumina structure to exemplary hydrothermal conditions caused the formation of boehmite from at least a portion of the alumina support, that is to say, effected at least a partial rehydration of the crystalline aluminum oxide matrix to a crystalline hydroxide form (see paragraph [0025] of Applicants' specification as filed). Thus, hydrothermal conditions (which include temperatures similar to those used in hydrocarbon synthesis) cause a chemical attack of alumina by water (or steam) such that at least some portion of the aluminum oxide converts to a hydroxide form. Thus, the cause of the problem that Applicants are addressing is different from what is taught in *Singleton*.

There is no mention in *Singleton* that the formation of water vapor during Fischer-Tropsch synthesis has or could have a negative impact on the stability of the catalyst support. *Singleton* does not appear to be aware that the presence of water vapor, so formed during hydrocarbon synthesis, could chemically react with the alumina support to form a hydrated form such as boehmite. *Singleton*

does not state that it would be desirable to address this issue of hydrothermal stability of the support, and what to do or should do to address it. To the extent that *Singleton* teaches one having ordinary skill in the art to use of a dopant comprising La and/or Ba in alumina for enhancing the *thermal* stability of the alumina support, *Singleton* does not teach nor suggest one having ordinary skill in the art to add these dopants or other elements to alumina in order to enhance the *hydrothermal* stability of the alumina support in order to prevent the transformation of some of the alumina phase to boehmite.

Applicants further argue that the disclosure of the addition of dopant elements to modify a structure in order to achieve a desired positive effect or improvement on a property of the modified structure does not teach that the addition of any of these dopant elements would necessarily improve another property of the structure. In other words, *all dopants which are known to improve the thermal stability of an alumina support may not necessarily improve its hydrothermal stability*.

Thus, based on *Singleton* as a whole, one having ordinary skill in the art is completely without notice of this important *hydrothermal* effect on the support structure and how it causes the support's instability, and further is not provided enough guidance from *Singleton* how to address and solve this problem.

In summary, in view of all the recitations in each of the independent Claims 15 and 44 that are neither taught nor suggested expressly or implicitly by *Singleton*, and further in view of the lack of guidance from *Singleton* to arrive to the present invention and its intended purpose, Applicants submit that *Singleton* does not explicitly or implicitly anticipate Claims 15 and 44 and *a fortiori* their respective dependent claims. Applicants respectfully request the Examiner to withdraw the § 102 rejection on Claims 2-12, 14-16, 21-32, 34-40 and 42-50.

## VII. New Claims

Applicants further added Claims 51-53 to add embodiments to which the Applicant are entitled.

New Claim 51 is dependent from Claim 15 via intervening Claim 7 and narrows the composition of the structural promoter by listing only cobalt and zirconium in the Markush group. New Claim 51 is supported by the application as filed, for example by the catalyst Examples and

paragraphs [0058]-[0059] of the specification as filed.

New Claim 52 is dependent from Claim 15, and narrows the composition of the structural promoter by reciting “the one or more structural promoter precursors comprise at least one element in a +4 oxidation state selected from the group consisting of Si, Ti and Zr, or comprise at least one element in a +2 oxidation state selected from the group consisting of Mg, Co, Cu, and Ni”. This new Claim 52 is supported by the application as filed, for example by paragraph [0030] of the specification as filed.

New Claim 53 is dependent from Claim 15, and narrows the composition of the structural promoter precursor by reciting “the one or more structural promoter precursors comprise a salt, an acid or an hydroxide of said structural promoter, said salt being selected from the group consisting of nitrate, acetate and acetylacetone”. This new Claim 53 is supported by the application as filed, for example by paragraph [0029] of the specification as filed.

Applicants submit that the cancellation of a total number of 3 claims in this Response (i.e., Claims 13, 33 and 41) is sufficient to cover these 3 new claims. Applicants respectfully request these new claims to be considered with the elected invention. Applicants believe that independent Claim 15 as currently-amended is in allowable form and since each of the new Claims 51-53 ultimately carries all the limitation of Claim 15, Claims 51-53 are *a fortiori* allowable as well.

Applicants respectfully request the allowance of new Claims 51-53.

### **VIII. Rejoinder of withdrawn Claims 17-19.**

Applicants believe that independent Claim 15 as currently-amended is in allowable form and that Claim 16, as a dependent claim of Claim 15, is *a fortiori* allowable as well. Withdrawn Claims 17-19 cover a hydrothermal process using the catalyst of Claim 16, which is allowable. Based on **MPEP § 821.04**, Applicant respectfully request the rejoinder of these process claims which were withdrawn as non-elected claims, for they include the use of the novel non-obvious catalyst of Claim 16. Applicants believe that withdrawn Claims 17-19 are free from 35 U.S.C. §101 or §112, first paragraph issues, and thus are allowable over the art of record. Applicants respectfully request the rejoinder of the withdrawn process Claims 17-19.

**IX. Conclusion**

Applicants believe that they have fully responded to the Office Action dated November 2, 2005, and that this amendment places the application in condition for allowance. Applicants believe that no new matter is introduced by way of this amendment.

Applicant respectfully requests the rejoinder of withdrawn non-elected Claim 17 and its dependent Claims 18 and 19 based on MPEP §821.04.

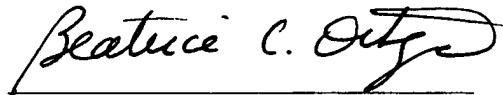
Favorable action at the Examiner's earliest convenience is respectfully solicited.

In the course of the foregoing discussions, Applicants may have at times referred to claim limitations in shorthand fashion, or may have focused on a particular claim element. This discussion should not be interpreted to mean that the other limitations can be ignored or dismissed. The claims must be viewed as a whole, and each limitation of the claims must be considered when determining the patentability of the claims. Moreover, it should be understood that there may be other distinctions between the claims and the prior art which have yet to be raised, but which may be raised in the future.

Should any fees have been inadvertently omitted, or if any additional fees are required or have been overpaid, please appropriately charge or credit those fees to Deposit Account Number 16-1575 of ConocoPhillips Company., Houston, Texas, and consider this a petition for any necessary extension of time.

Should there be any remaining issue which the Examiner believes would possibly be resolved by a conversation, the Examiner is invited to call the undersigned at (281) 293-4751 so that further delay in a Notice of Allowance can be avoided.

Respectfully submitted,



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